F. CRITICALITY PREVENTION IN FIRE FIGHTING

The first three minutes of a fire's existence is the most effective time to fight it. Prompt action should be taken to apply an extinguishing agent or to isolate the burning material. Since water is the most efficient general purpose agent for fighting fires, its early use in an approved manner is encouraged. Automatic detection and extinguishing systems are generally recommended to facilitate early and effective control of fires.

In areas containing fissile materials, the use of water is limited as outlined below to keep the risk of nuclear criticality at an acceptably low level. However, the consequences of releasing alpha-radioactive materials to the environment would probably exceed the consequences of a nuclear criticality. The senior fire officer is therefore authorized to use whatever methods he judges to be necessary to preserve the integrity of building structures.

Chemical processing facilities (or areas within facilities) are categorized and posted to denote the fire fighting agents that can be used safely. The classification and posting methods used by Atlantic Richfield Hanford Company (ARHCO) are consistent with those currently in use by other Hanford contractors.

1. Definitions

The risk that a criticality could be caused by adding water to chemical processing facilities varies from zero to high, depending on the quantity, form and packaging of the fissile materials present. For fire fighting purposes, chemical processing facilities have been divided into four categories, depending upon the criticality risks involved, as follows:

Category	Probability of Criticality if Water is Added
A	Zero. The addition of water to the facility cannot cause criticality because the quantities of fissile materials present are too small.

B Minimal. The likelihood of criticality resulting from fighting a fire with water is very small. While fissile materials are normally present in quantities exceeding a minimum critical mass, the fissile materials are in a form, in packaging, or so stored that criticality is practically impossible.

C Finite. Under some foreseeable conditions, the addition of water could cause criticality. This category embraces two types of areas:

1. Those process areas in which fissile materials are normally present in quantities exceeding a minimum critical mass; the fissile materials are normally held in such a manner that the addition of water would not cause criticality.

2. The personnel working areas immediately surrounding Category D facilities.

D High. Fissile materials are normally present in a configuration that could be made critical by the addition of water, or the configuration is very likely to be changed by fire such that the addition of water could cause criticality.

2. Designation of Areas

Each Criticality Prevention Specification has a Fire Fighting Section in which the fire fighting categories assigned to the facilities covered will be specified along with any special fire fighting restrictions or precautions. The assigned categories are subject to change with changing process or equipment. All plant areas not specifically mentioned in Criticality Prevention Specifications are in Category A.

To provide immediate fire fighting guidance, all areas (except Category A) are posted with an appropriate noncombustible sign denoting the fire fighting category for that area. The signs should be mounted 1/8 inch from the surface to which they are attached and positioned in the center of and immediately above the entrance to each categorized area. Usually this will

be on the face of the door frame. Where the height of the door exceeds seven feet, the sign will be posted at a height of six feet on the frame opposite the door hinges. Each sign will be lettered in black, in the shapes and colors indicated below. "Scotch Lite" reflective colors are recommended.

CATEGORY A: No posting.

CATEGORY B: Diamond shape with a fluorescent green background showing the letter "B". Areas excluded from posting requirements are B Plant process cells, underground waste tanks, vaults, and cribs.

CATEGORY C: An equilateral triangle with a fluorescent red background showing the letter "C" is used to denote rooms or areas. A square sign with the notation "C HOODS" on a fluorescent orange background is used to denote glove boxes or other enclosures within a room.

CATEGORY D: A round sign with a fluorescent blue background showing the letter "D" is used to denote rooms or areas. A rectangular sign with the notation "D HOODS" on a fluorescent yellow background is used to denote glove boxes, refrigerators or other enclosures within a room.

3. Fire Fighting Precautions

The approved methods of fire fighting in each category are listed below. There are no restrictions in any of the categories for the use of dry chemicals, CO_2, Freon-1301, high expansion foam, and inert gases providing the methods do not displace or rearrange the fissile materials. Restrictions on the use of water as defined below and in Table F.1 are observed unless authorization from the attendant building management is obtained at the time of emergency. However, every effort is made to prevent a breach of the building confinement. When in the opinion of the senior fire officer, there is imminent danger of loss of control, he is allowed to fight the fire at his discretion after considering all circumstances.

Category A Areas

No special criticality precautions are taken in fighting fires in Category A areas. Automatic fire fighting systems of any approved type may be installed, and water may be used in any quantity or form.

Category B Areas

No special criticality precautions are taken by fire fighters in Category B areas. Automatic fire fighting systems of any approved type may be installed. While water may be used in any quantity or form, the use of high expansion foam or water fog is preferred over a stream of water to minimize the probability of relocating fissile materials into a critical array. Operating personnel are to be alert to the possibility that fissile materials could be pushed together as a result of the fire or fire fighting efforts (e.g., collapsing structures, gushing water, etc.) thereby significantly increasing the risk of criticality.

Category C Areas

Plans for the use of water to fight fires in Category C areas are incorporated into the Criticality Prevention Specifications applicable to the facility involved and may include dry chemicals, water fog, high expansion foam or automatic sprinkler systems. Automatic fire fighting systems which use limited amounts of water may be recommended. Fire fighters should not direct a solid stream of water at process equipment or floor areas in the vicinity without prior clearance from the attendant building management or in his absence, the senior fire officer.

Fire fighters should be alerted to the possibility that fissile materials in the hoods may have been or may be rearranged from their normal position into a more reactive configuration. If possible, an assessment of the additional risk of criticality should be made, preferably by operational personnel before the fire fighting methods other than those permitted above are used.

Situations which potentially present a hazard include the following:

a. The widespread accumulation of process solution or solids on the floor or in a sump to a depth of two inches or greater;

b. An accumulation of resin or other process solids in a mound more than four inches high;

c. Burning plutonium metal; or

d. Metallic plutonium if it has been deformed or displaced from its normal position.

Category D Areas

Directions for the use of water to fight fires in Category D areas is incorporated into the Criticality Prevention Specifications applicable to the area. Automatic fire fighting systems which use water are not permitted, and the inadvertent drainage of water into these areas is precluded by design. The use of water fog will be acceptable under conditions listed in the Criticality Prevention Specifications. Fire fighters should not use water in any other forms without prior clearance from the attendant building management or, in their absence, the senior fire officer. If the confinement barriers enclosing a Category D area are destroyed during a fire, a prudent decision must be made, after considering the immediate facts, as to what means of fire fighting will be required to minimize injury to personnel, uncontrolled contamination spread and damage to facilities.

4. Responsibilities

The processing, storing or transporting of fissile materials within chemical processing facilities is controlled by Criticality Prevention Specifications. All chemical processing areas containing fissile material are categorized for fire fighting and the category listed in the Criticality Prevention Specification.

In addition, the following specific responsibilities are assigned to each Operations Division Department Manager with respect to those areas under his functional control:

a. Implementing the fire fighting restrictions covered in this Operating Instruction.

b. Posting the facilities under his jurisdiction and keeping the posting current.

c. Providing procedures and training for fire fighting.

d. Keeping the Fire Protection Section informed as to the categories currently assigned to the various work areas.